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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,906	09/10/2003	Thomas Jan Kulp	02TM-104835	3601

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EXAMINER	
NGUYEN, DUNG T	
ART UNIT	PAPER NUMBER
2828	

DATE MAILED: 01/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/658,906	KULP ET AL.	
	Examiner	Art Unit	
	Dung (Michael) T. Nguyen	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-92* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-16,34-62 and 80-92* is/are allowed.

6)☒ Claim(s) *17,18,20-22,25-31,63,64,66-68 and 71-77* is/are rejected.

7)☒ Claim(s) *19,23-24,32-33,65,69-70,78-79* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/28/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 17-33 and 63-79 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 17-18, 20, 22, and 25-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326).

With respect to claim 17, Sanders et al. show in Fig.11 a light-generating device (65A) producing light at more than one wavelength (column 7, lines 49-50); an optical fiber amplifier (12) to accept light from said light-generating device and produce amplified light at said more than one wavelength, wherein said optical fiber amplifier is a Yb-doped (column 16, line 15); and a nonlinear frequency converter (64) including an optical parametric oscillator (OPO) (column 1, lines 27-29) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength.

Sanders et al. lack the optical fiber amplifier is a tapered optical fiber amplifier.

Dejneka et al. teach the optical fiber amplifier is a tapered optical fiber amplifier in Fig.2 (column 5, lines 63-67).

Sanders et al. and Dejneka et al. are under the same analogous art of fiber laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. what is taught by Dejneka et al. in order to obtain an efficient coupling between a large multi-mode pump source and a single-mode fiber (column 5, lines 58-62) because the double clad fiber amplifier in Sanders et al. would have the problems of the lasing power threshold and a greatly-reduced pump overlap with the doping profile relative to the signal overlap as taught by Dejneka et al. in column 2, lines 34-49 and column 3, lines 9-12.

With respect to claim 18, Sanders et al. disclose said light-generating device produces continuous-wave light (column 17, lines 3-4).

With respect to claim 20, Sanders et al. disclose in Fig.11 said light-generating device (65A) is a multi- longitudinal-mode laser.

With respect to claim 22, Sanders et al. disclose said light-generating device is a laser diode (column 3, lines 28-29).

With respect to claims 25 and 26, Sanders et al. disclose said light-generating device produces wavelength tunable light between two wavelengths (column 3, lines 29-30).

With respect to claim 27, Sanders et al. disclose said optical fiber amplifier includes at least one pump laser with an output of near 915 nm (900 nm) (column 4, lines 4-5).

With respect to claim 28, Sanders et al. disclose said OPO has a cavity that tunably adjusts said wavelength output (column 8, lines 16-21).

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326) and further in view of Scheps (5097477).

With respect to claim 21, Sanders et al. and Dejneka et al. disclose all limitations of the claim 17 except for the Nd:YAG laser.

Scheps teaches a Nd:YAG laser (column 1, line 39).

Sanders et al., Dejneka et al., and Scheps are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Scheps in order to employ a laser device with the combination of compact side and high lasing efficiency (column 1, lines 35-43).

Claims 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326) and further in view of Richter (6751010).

With respect to claim 29, Sanders et al. and Dejneka et al. disclose all limitations of the claim 17 except for the OPO generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Richter teaches the OPO generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam (column 1, lines 45-46).

Sanders et al., Dejneka et al., and Richter are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Richter in order to resonate only one of the signal beam and the idler beam within the optical cavity of the OPO (column 1, lines 36-50).

With respect to claim 30, Sanders et al. and Dejneka et al. disclose all limitations of the claim 17 except for the OPO generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Richter teaches the OPO generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam (column 1, lines 42-43).

Sanders et al., Dejneka et al., and Richter are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Richter in order to resonate the signal beam and the idler beam within the optical cavity of the OPO (column 1, lines 36-44).

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326) and further in view of Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp-pumped PPLN OPO Technical Paper in CLEO 2001).

With respect to claim 31, Sanders et al. and Dejneka et al. disclose all limitations of the claim 17 except for the OPO generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Goers et al. teach in Fig.1 the OPO generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output (first page, third paragraph).

Sanders et al., Dejneka et al., and Goers et al. are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Goers et al. to span the absorption range of gas encountered in industrial refineries by using the backscatter absorption gas imaging system (first page, third paragraph).

Claims 63-64, 66, 68, and 71-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326) and further in view of Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp-pumped PPLN OPO Technical Paper in CLEO 2001).

With respect to claim 63, Sanders et al. show in Fig.11 a light-generating device (65A) producing light at more than one wavelength (column 7, lines 49-50); an optical fiber amplifier

(12) to accept light from said light-generating device and produce amplified light at said more than one wavelength, wherein said optical fiber amplifier is a Yb-doped (column 16, line 15); and a nonlinear frequency converter (64) including an optical parametric oscillator (OPO) (column 1, lines 27-29) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength.

Sanders et al. lack the optical fiber amplifier is a tapered optical fiber amplifier.

Dejneka et al. teach the optical fiber amplifier is a tapered optical fiber amplifier in Fig.2 (column 5, lines 63-67).

Sanders et al. and Dejneka et al. are under the same analogous art of fiber laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. what is taught by Dejneka et al. in order to obtain an efficient coupling between a large multi-mode pump source and a single-mode fiber (column 5, lines 58-62) because the double clad fiber amplifier in Sanders et al. would have the problems of the lasing power threshold and a greatly-reduced pump overlap with the doping profile relative to the signal overlap as taught by Dejneka et al. in column 2, lines 34-49 and column 3, lines 9-12.

However, Sanders et al. and Dejneka et al. lack a camera responsive to backscattered illumination by the light source.

Goers et al. teach a camera responsive to backscattered illumination by the light source (first page, first paragraph).

Sanders et al., Dejneka et al., and Goers et al. are under the same analogous art of fiber laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Goers et al. in order to view the real time video visualization of gas plumes (first page, first paragraph).

With respect to claim 64, Sanders et al. disclose said light-generating device produces continuous-wave light (column 17, lines 3-4).

With respect to claim 66, Sanders et al. disclose in Fig.11 said light-generating device (65A) is a multi- longitudinal-mode laser.

With respect to claim 68, Sanders et al. disclose said light-generating device is a laser diode (column 3, lines 28-29).

With respect to claims 71 and 72, Sanders et al. disclose said light-generating device produces wavelength tunable light between two wavelengths (column 3, lines 29-30).

With respect to claim 73, Sanders et al. disclose said optical fiber amplifier includes at least one pump laser with an output of near 915 nm (900 nm) (column 4, lines 4-5).

With respect to claim 74, Sanders et al. disclose said OPO has a cavity that tunably adjusts said wavelength output (column 8, lines 16-21).

Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326), further in view of Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp-pumped PPLN OPO Technical Paper in CLEO 2001) and even further in view of Scheps (5097477).

With respect to claim 67, Sanders et al., Dejneka et al., and Goers et al. disclose all limitations of the claim 63 except for the Nd:YAG laser.

Scheps teaches a Nd:YAG laser (column 1, line 39).

Sanders et al., Dejneka et al., Goers et al., and Scheps are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al., Dejneka et al., and Goers et al. what is taught by Scheps in order to employ a laser device with the combination of compact side and high lasing efficiency (column 1, lines 35-43).

Claims 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326), further in view of Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp-pumped PPLN OPO Technical Paper in CLEO 2001) and even further in view of Richter (6751010).

With respect to claim 75, Sanders et al., Dejneka et al., and Goers et al. disclose all limitations of the claim 63 except for the OPO generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam.

Richter teaches the OPO generates a signal beam and an idler beam, and wherein said OPO is singly resonant at the wavelength of either said signal beam or of said idler beam (column 1, lines 45-46).

Sanders et al., Dejneka et al., Goers et al., and Richter are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al., Dejneka et al., and Goers et al. what is taught by Richter in order to resonate only one of the signal beam and the idler beam within the optical cavity of the OPO (column 1, lines 36-50).

With respect to claim 76, Sanders et al., Dejneka et al., and Goers et al. disclose all limitations of the claim 63 except for the OPO generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam.

Richter teaches the OPO generates a signal beam and an idler beam, and wherein said OPO is doubly resonant at the wavelength of said signal beam and at the wavelength of said idler beam (column 1, lines 42-43).

Sanders et al., Dejneka et al., Goers et al., and Richter are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al., Dejneka et al., and Goers et al. what is taught by

Richter in order to resonate the signal beam and the idler beam within the optical cavity of the OPO (column 1, lines 36-44).

Claim 77 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders et al. (6229828) in view of Dejneka et al. (6324326) and further in view of Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp-pumped PPLN OPO Technical Paper in CLEO 2001).

With respect to claim 77, Sanders et al. and Dejneka et al. disclose all limitations of the claim 63 except for the OPO generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

Goers et al. teach in Fig.1 the OPO generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output (first page, third paragraph).

Sanders et al., Dejneka et al., and Goers et al. are under the same analogous art of laser.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sanders et al. and Dejneka et al. what is taught by Goers et al. to span the absorption range of gas encountered in industrial refineries by using the backscatter absorption gas imaging system (first page, third paragraph).

Allowable Subject Matter

Claims 19, 23-24, 32-33, 65, 69-70, and 78-79 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Sanders et al., Dejneka et al., and Goers et al. fail to disclose the limitations as recited in the above claims.

Claims 1-16, 34-62, and 80-92 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1, 46-47, and 92 are allowed over the Sanders et al., Dejneka et al., and Goers et al. prior art because they fail to teach the limitations of the absorption of the output of the pump laser by the gain medium varies by no more than about 10% over a range of ambient temperatures of from about 0 C to about 40 C.

Claims 2-16 and 48-62 are found allowable due to their dependency on claims 1 and 47.

Claims 34 and 80 are allowed over the Sanders et al., Dejneka et al., and Goers et al. prior art because they fail to teach the limitations of two or more light-generating devices each producing light at more than one wavelength and a switch to select light from one of said two or more light-generating devices.

Claims 35-45 and 8-91 are found allowable due to their dependency on claims 34 and 80.

Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung (Michael) T Nguyen whose telephone number is (571) 272-1949. The examiner can normally be reached on 8:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-3329.

Michael Dung Nguyen

11/17/05